Nevada Computer and Technology Education Standards

Introduction

The Nevada Legislature has recognized the importance of computer and technology education in SB 466, Section 8. NAC 389.688 requires a minimum of a one semester (1/2 credit) computer course for graduation.

Technology is the application of resources and knowledge to solve problems and meet human needs. Technology includes, but is not limited to, the use of computers. Society needs people adept at using technology. Advances in technology affect all of earth's living and nonliving systems. It is vital that students understand the interrelationships of technology, the environment and human activity. We should incorporate technology as students develop critical thinking skills and strategies in their classrooms. Understanding that students learn in different ways, we can help them use technology as a means to apply academics within a real-world context. Society needs individuals who are literate in technology and possess the skills that enable them to participate in a high-performance work force that adapts readily to constantly changing technology.

In order for teachers to implement and integrate the following standards, they must have adequate staff development.

Curriculum Integration

Computer and technology education is to be integrated within all grade level content standards. All teachers share this responsibility for student success.

Elementary School

Early learning experiences build the foundations for later learning. Integrating computer skills and technology concepts provides tremendous opportunity for students to apply knowledge through the design and use of materials and processes, to systematically solve real problems, and to gain new knowledge. Critical thinking, teamwork, research and development, experimentation, and testing help deliver the goals of the elementary curriculum and enrich the entire learning and teaching process.

Middle School

Technological learning and computer skill acquisition, with an emphasis on applied problem solving, continues the pathway between elementary and high school. The integration of computer and technology skills will provide an opportunity to apply theoretical concepts in real-world applications throughout the curriculum. Hands-on activities reinforce and extend student understanding and retention. Teachers emphasize the role technology plays in our day-to-day lives and the impact it has on individuals, societies and the environment. Technology enhances project-based learning and is designed to facilitate individual interests and learning styles. Experts continue to emphasize the need for technologically literate individuals. Exposure to the various areas of technology leads to informed career choices.

High School

Students must develop an understanding of the nature of technology, technological systems and applications, design and ingenuity, and the impact of various technologies. Course offerings must include elements to ensure students will comprehend and apply the computer and technology skills necessary to solve real-world problems. More in-depth courses will be offered to those students interested in pursuing a variety of career opportunities.

Problem-Solving

Content Standard 1.0: *Students will utilize problem-solving processes through the use of resources to reach a desired outcome.*

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
		1.8.1 Differentiate design/problem-solving methods and components of technology using accurate terminology.	1.12.1 Analyze a variety of problem-solving approaches, which can be used and combined in seeking solutions.	**Knowledge**
		1.8.2 Select and evaluate appropriate designs requiring **optimization** and making **trade-offs**.	1.12.2 Develop and implement a design/problem-solving method based on a need or want.	**Processes**
		1.8.3 Select and apply a design/problem-solving method to reach a desired outcome.		**Application**

Optimization- The process of making an alternative work as well as it can. (Hacker)
Trade-offs - An exchange of one thing in return for another to achieve a desired result.

Productivity Tools

Content Standard 2.0: *Students use appropriate productivity tools including, but not limited to, word processing, spreadsheet, database, multimedia and telecommunications.*

By the end of **Grade 3** students know and are able to do:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
2.3.1 Locate and use letters, numbers, and special keys on a keyboard using the left or right hand.	2.5.1 Apply correct finger placement for basic keyboarding skills.	2.8.1 Demonstrate proficiency and accuracy in keyboarding skills.	2.12.1 Demonstrate advanced proficiency and accuracy in keyboarding skills.	**Keyboarding**
2.3.2 Create a document that demonstrates simple typing and editing skills.	2.5.2 Create a document including a graphic using basic formatting techniques that demonstrate the ability to type, edit, and print.	2.8.2 Create a document using advanced formatting techniques that demonstrate the ability to import a graphic, type, edit, and print.	2.12.2 Create a multi-page document in conjunction with other tools that demonstrate the ability to type, format, edit, and print.	**Word Processing**
2.3.3 Search a database to locate specific information (e.g. electronic sources, telephone book, encyclopedia, and library card catalog).	2.5.3 Create a database with predefined fields, enter data for multiple records, and print reports based on sort query using ascending and descending order.	2.8.3 Create a database, define fields, enter data for multiple records, and print reports based on sort and query.	2.12.3 Create a database, define fields, enter data for multiple records, and print reports based on sort and query. Interpret report based on data.	**Database**
2.3.4 Utilizing a pre-designed spreadsheet, demonstrate the ability to enter simple labels, values, and formulas.	2.5.4 Construct a guided spreadsheet containing appropriate labels, values, formulas, and simple functions.	2.8.4 Generate a spreadsheet including labels, values, formulas, and functions; create a chart to visually represent data. Print a spreadsheet showing formulas.	2.12.4 Generate a spreadsheet including labels, values, formulas, and functions; create a chart to visually represent data. Analyze the significance of the data. Print a spreadsheet showing formulas.	**Spreadsheet**

By the end of **Grade 3** students know and are able to do:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
2.3.5 Explain the purpose of a multimedia presentation using **multimedia** software.	2.5.5 Create a multimedia document or presentation using text, graphics, and/or sound.	2.8.5 Create a multi-page multimedia presentation using text, graphics, and sound to effectively communicate a concept.	2.12.5 Create and present a multi-page, multimedia presentation incorporating three or more of the following: text, graphics, sound, animation, digital video or linking. Analyze and critique a multimedia presentation.	**Multimedia**
2.3.6 Create and save files on various storage media.	2.5.6 Explain the differences between **data files**, **program files**, and describe and use the **file management** software of a computer.	2.8.6 Organize files on a computer disk, drive, server, or other storage device.		**File Management**
2.3.7.1 Identify **electronic communication** devices. 2.3.7.2 Identify devices that require connectivity.	2.5.7.1 Describe the process of accessing a LAN and demonstrate the process as available. 2.5.7.2 Define and explain the uses of an electronic communication device, **telecommuting,** and **teleconferencing**.	2.8.7.1 Explain the advantages of connectivity with various systems to share information and resources. 2.8.7.2 Employ the use of electronic communication.	2.12.7 Locate and evaluate sources of distance learning, telecommuting and teleconferencing and analyze the uses these electronic communications.	**Connectivity, Electronic Devices, and Distance Learning,**

Multimedia- The use of more than one media, such as any combination of sound, graphics, animation and video. A "multimedia" computer typically has speakers for sound and a fast microprocessor that can handle graphics, animation and video. A multimedia software application usually contains images, audio, text and, in many cases, video clips and animations.

Utility- A program used to solve a specific problem or fill a particular system management need. For instance, a backup utility is a program that helps you back up your computer's hard drive.

Electronic communication- Any content used to convey a message that has been transmitted via electronic means such as e-mail, video conferencing, etc.

Telecommuting- Telecommuting is a term used to indicate the process of working outside of the office by a modem hookup to the main office system.

Teleconferencing- A telephone communication in which more than two people are simultaneously connected so they can exchange verbal comments as if they were in the same room having a face-to-face conference. A teleconference need not have visual communications in addition to audio communications, but modern technology now makes it possible to see conference members on monitor screens or television screens.

File management-Provides functions to delete, copy, move, rename, view files, and manage directories or folders.

Networking Systems – LAN, WAN, Intranet, Internet

Data files- A data file. Whatever you create with an application, including information you type, edit, view, or save. A document may be a business report, a picture, or a letter and is stored as a file on a disk.

Program files- On a PC, an executable file that starts an application or program. A program file has an .EXE, .PIF, .COM, or .BAT filename extension.

Research Tools

Content Standard 3.0: *Students use various technology tools to research information and evaluate its accuracy and appropriateness in order to solve problems and make decisions.*

By the end of **Grade 3** students know and are able to do:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
3.3.1 Select a research topic or define a problem using technology tools.	3.5.1 Select a research topic or define a problem and predict outcomes using technology tools.	3.8.1 Select a research topic or a statement of a problem identifying its elements, its scope, and the expected outcomes using technology tools.	3.12.1 Independently identify a research topic or state a problem that clearly identifies its elements, its scope, and the expected outcomes using technology tools.	**Define a Problem**
	3.5.2 Generate keywords for a research topic or problem.	3.8.2 Generate a list of keywords for a research topic or problem and conduct a search of electronic-based sources.	3.12.2 Generate a list of keywords for a research topic or problem with **qualifying modifiers** and conduct a search of electronic-based sources.	**Keywords and Sources**
3.3.3 Select information for a research topic or problem from a remote resource.	3.5.3 Select information from a variety of remote resources for a research topic or problem exploring **hyperlinks**.	3.8.3 Select and evaluate information from a variety of remote resources for a research topic or problem exploring hyperlinks.	3.12.3 Utilizing different search strategies, conduct research using hyperlinks to select information for a specific topic or problem.	**Information Links**

Qualifying modifiers- Words or symbols used to define or limit the results of a search.

Hyperlinks- A section of text or graphic that when clicked, will take you to another area of a service or Web Page. Most Internet Service Providers support hyperlinks in browsers, Instant Messages and E-Mail. They are quite helpful for those not experienced in addresses to route to where they need to be. These are often called just links for short. Links can carry you to a different site, other text on the same site or a specific area of a specific site, directly to specific target of text or graphics.

Remote resource- Resources not located on the user's machine. The resources may be located on another machine/server at the same location or the resources may be located on the Internet.

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3.3.4 Identify and examine **organizational formats** using a technology tool to arrange information.	3.5.4 Use an organizational format to arrange information for presentation or decision-making.	3.8.4 Use an organizational format to arrange information for presentation or decision-making.	3.12.4 Organize information logically for presentation or decision-making.	**Organization**
	3.5.5 Demonstrate an understanding of intellectual property and identify source and content of information collected.	3.8.5 Check collected information for reliability, authenticity, and timeliness, citing sources of copyrighted materials in papers, projects, and multi-media presentations.	3.12.5 Compare and contrast collected information to validate its reliability, authenticity, and timeliness.	**Evaluation**
	3.5.6 Generate a list of sources.	3.8.6 Generate a bibliography.	3.12.6 Demonstrate the ability to document all sources using an accepted standard citation format.	**Citation**
	3.5.7 Summarize and share the research process and its outcome.		3.12.7 Given a rubric, evaluate the research process and its outcome.	**Evaluation of Results**

Organizational formats-Outlines, Venn diagrams, web mapping, flow charts or any other schematic used to organize information.
Venn diagrams-A pictorial representation using circles and squares so positioned as to represent an operation in set theory. A graph that employs circles to represent logical relations by the inclusion, exclusion, or intersection of the circles.

Tools and Processes

Content Standard 4.0: *Students will identify, apply concepts, and manage various tools and resources to evaluate their accuracy and appropriateness in solving problems and making decisions.*

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
4.3.1 Identify the appropriateness and uses of resources and tools in **technology** based activities.	4.5.1 Recognize that technological **resources** include people, information, materials, machines, energy, capital, and time.	4.8.1 Explain how technology skills and tools enhance productivity in creating projects, building prototypes and modeling. (e.g., measuring, shaping, forming and fastening materials)	4.12.1 Analyze how the development of new tools, materials, and processes is necessary to maintain and improve high productivity and quality.	**Knowledge**
4.3.2 Select and use applicable tools for tasks.	4.5.2 Employ tools and materials to design or develop products or projects.	4.8.2 Use tools, instrumentation, equipment, materials, and processes to make designs, simulations, and **prototypes**.	4.12.2 Use tools to design and/or create solutions that are functional, aesthetically pleasing, demonstrate quality, and have value greater than the investment of time, energy, effort, and other resources.	**Process**

Technology- Human innovation in action. It involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities. (ITEA) The use of accumulated knowledge to process resources to satisfy human needs and wants. (Hacker)
Resources- The things needed to get a job done. In a technical system the seven types of resources are people, information, materials, tools and machines, energy, capital, and time.
Prototype- A working model of a new product, intended to test its operation. (Wright)

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
4.3.3 Recognize the importance of safety in computer and technology applications.	4.5.3 Demonstrate the importance of safety and ease of use in selecting appropriate tools.	4.8.3 Compare and contrast the safe use of technology tools, hand and power tools, processes, and materials in diverse computer and technology applications.	4.12.3 Evaluate the available tools and select the appropriate tool and process that would safely accomplish the task.	**Safety**
4.3.4 With teacher guidance, resolve difficulties using tools or **devices** including **input devices**, **output devices,** and devices requiring **connectivity** to successfully perform basic computer operations.	4.5.4 Solve difficulties with tools or devices to accomplish the desired result including computer operations and recognize basic operational problems, such as printer jams, and possible solutions.	4.8.4 Demonstrate an understanding of the operation and maintenance of technology tools such as hand tools, power tools, lasers, hydraulics, pneumatics, electronics, hardware, software, **CNC** machines, computers, robotics, and fiber optics.	4.12.4 Evaluate and then correct non-functioning technology system/subsystem areas needed to accomplish required tasks.	**Trouble-shooting**

Devices- Things used or constructed for particular purposes such as machines to perform one or more relatively simple tasks. (American Heritage Dictionary)
Input Devices- Peripheral devices that enter data into the computer, such as a keyboard, scanner, mouse, or digitizer tablet.
Output Devices-Any peripherals that transfer or transmit data from the computer, such as screen, printer, or communications line.
CNC Machines-Computer numerical control (machines that might be used to control another machine such as a robotic arm)

Systems

Content Standard 5.0: *Students will recognize that systems are made up of individual components and that each component affects the operation of the system and its relationship with other systems.*

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
5.3.1 Define a *system*.	5.5.1 Explain open, closed, simple, complex, micro and macro systems.	5.8.1 Interpret resources that are essential and those that must be used effectively to produce a desired outcome, and **output** from one system may be **input** to another system.	5.12.1 Interpret the ways technological systems have evolved and will continue to evolve to satisfy human needs and desires.	**Knowledge**
5.3.2 Identify the parts of a system and explain how the parts working together allow the system to do things the individual parts are unable to do alone (e.g., components of a computer system).	5.5.2 Explain how systems depend on a variety of resources to produce a desirable outcome (e.g., computer information processing cycle).	5.8.2 Differentiate among various systems, explain capabilities and limitations, and identify the ways in which they are controlled to produce a desired outcome (e.g., limitations of the components of a computer system).	5.12.2 Demonstrate how systems are planned, organized, designed, built, and controlled.	**Process**
5.3.3 Identify and categorize systems that provide food, clothing, shelter, entertainment, communications, health care, security, and other necessities and comforts of life.	5.5.3 Classify systems according to type and level. (e.g., **open loop system** or **closed loop system**, simple or complex, and micro or macro)	5.8.3 Use a system to achieve a desired outcome in the areas of construction, communication, manufacturing, energy, power, transportation, and biotechnology.	5.12.3 Evaluate systems **model(s)** including the stages of input, processes, output, **feedback**, and consequences.	**Application**

Output- The results, good and bad, of the operation of any system. (Wright)

Input- Something put into a system or expended in its operation to achieve a result or output. (American Heritage Dictionary)

Open loop system- A system that does not use information about the output to affect the process.

Closed loop system- A system that uses feedback to affect the process.

Model- The testing of a problem solution or a system itself. (Hacker)

Feedback- The return of information about the result of a process. (American Heritage Dictionary)

Implications on Society

Content Standard 6.0: Students will evaluate the impact and ethical implications on individuals, society and the environment.

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
6.3.1 Describe how technology is used in daily activities to meet personal needs. Describe computer piracy and the personal consequences of inappropriate use.	6.5.1 Examine **products** and communicate how that product solved a human need or want.	6.8.1 Practice legal and ethical behaviors when using information and technology. Discuss the consequences of misuse on society and the environment.	6.12.1 Analyze the impact of new and improved products and services on the quality of life.	**Knowledge and Ethics**
6.3.2 Practice etiquette using technology. Describe changes in the local community because of technology.	6.5.2 Explain how physical environments are changed by technological developments.	6.8.2 Evaluate the effect technology has on society and the environment.	6.12.2 Analyze how the effects of a given technology may be unacceptable under a certain set of circumstances, but acceptable under another set of circumstances.	**Application and Electronic Communication**
	6.5.3 Describe the relationship between careers and technological developments.	6.8.3 Examine the role of technology in the workplace and explore careers that use technology.	6.12.3 Research and select a career choice, develop a career plan, and select the courses/program for **entry-level skills.** (e.g. Career Information System)	**Careers**

By the end of **Grade 3** students know and are able to:	By the end of **Grade 5** students know and are able to do everything required in previous grades and:	By the end of **Grade 8** students know and are able to do everything required in previous grades and:	By the end of **Grade 12** students know and are able to do everything required in previous grades and:	
6.3.4 Describe common uses of technology in daily life and how environments are changed.	6.5.4 Explain society's use of technology and describe both the positive and negative impacts on the workplace, society, and the environment.	6.8.4 Explain how people can control the technologies they develop and use, and why people are responsible for the effects these have on society, the environment and careers.	6.12.4 Analyze significant events, inventions, and discoveries in the history of technology and their affects on beliefs, attitudes and behavior in business, society, or culture.	**Societal Impacts**

Products- Objects, structures, or environments, produced by human or mechanical effort. (Todd)
Entry-level skills- Basic skills required entering a given occupation.